ELECTRICAL REVIEW

[ILLUSTRATED]

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ELECTRIC LIGHT, TELEPHONE TELEGRAPH AND SCIENTIFIC PROGRESS.

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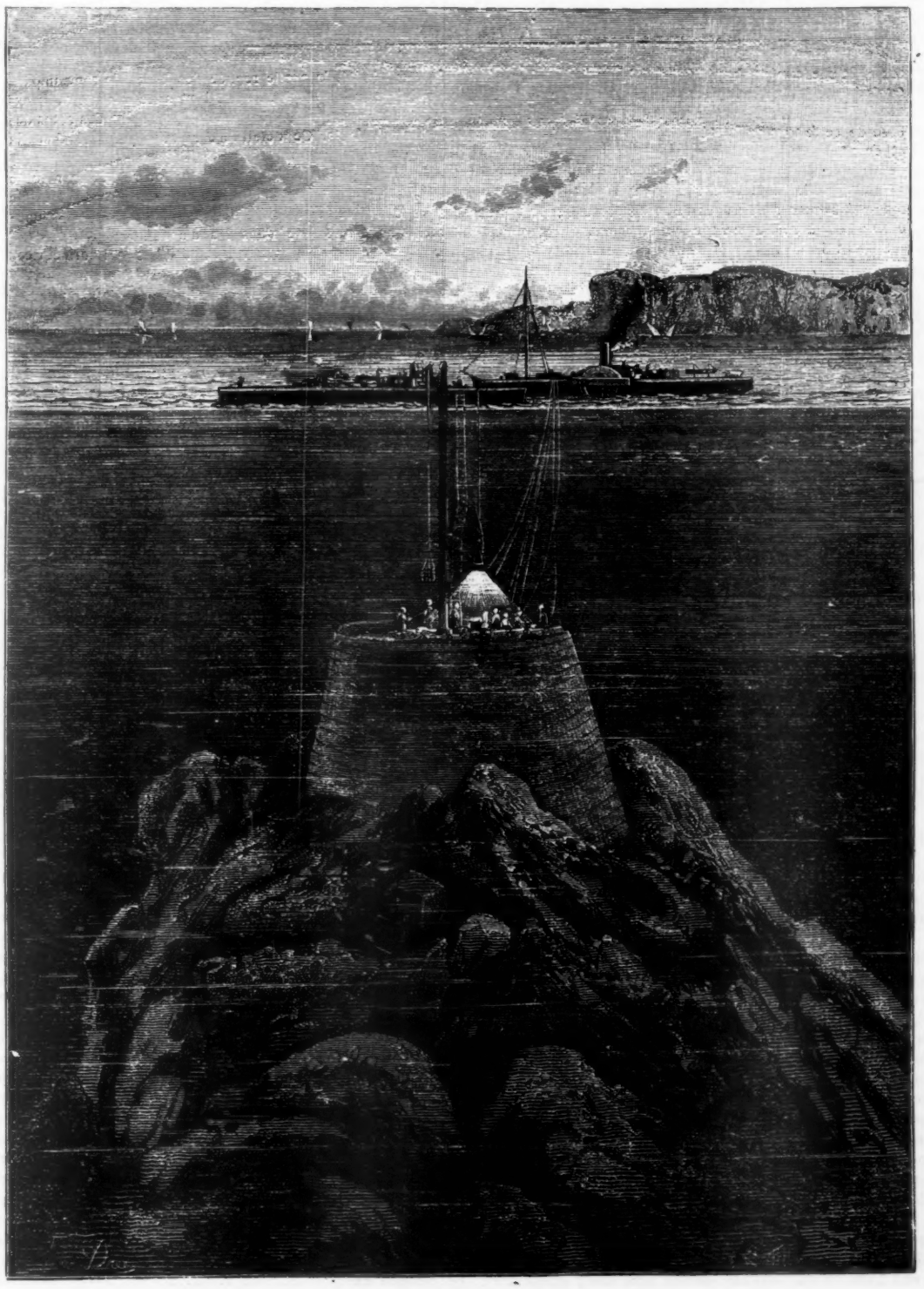
On the Application of the Electric Light to Submarine Construction.

As is well known, the light produced by the electric arc borrows none of its splendor from the medium in which it is found; it will exist in a vacuum or in any neutral gas whatever, and it is therefore easy to devise lamps which can be transported to the depths of rivers or the sea, for the purpose of making explorations or to furnish light to the workmen.

Our illustration shows with great accuracy the general arrangements for operations which are carried on to erect, at any distance below the surface of the water, the foundations of a lighthouse, a bridge pier, a signal tower, or any submarine structure. After having determined, by means of previous explorations, the proper locality for the foundations, barges containing the necessary materials are brought to the place; a steamer brings the staff of workmen, and furnishes the motive power to drive the dynamo machines producing the electric light. It is, of course, understood that the men who work under water are equipped with diving armor in order to be able to remain submerged as long as necessary, and telephones in order to make the requisite communications with the floating portion of the staff and equipment. In this manner, provided that the sea is calm, the work can go on regularly, and the foundations of the structure may be as solidly laid as though on dry land.

The new method has enabled engineers to dispense with the old plan of using caissons filled with concrete. Foundations thus established are not always capable of resisting the action of the waves, by reason of their imperfect adhesion to the surface of the rocks. This fact has been perfectly confirmed by the experience of some years at Lavezzi, in the Mediterranean Sea. In the Straits of Bonifacio there is a very dangerous shoal, caused by a rock which the sea only covers by a few yards; it was on this rock that the transport frigate Semiramis foundered in 1855, while carrying troops to the Crimea. After that terrible catastrophe, measures were taken to point out this spot to navigators, and an immense buoy was anchored above the fatal rock; tempests destroyed it several times, and towards 1869 a masonwork tower replaced the buoy, but the foundations of the tower being supported by a caisson, it was overthrown by a tempest in 1875. It was not until 1877 that the existing lighthouse at Lavezzi was solidly fastened, this time by strong bars of iron, to the mass of rocks on which it is supported.

According to the nature of the submarine work required, the arrangements of the lights can be varied; multiple lights can be used, each workman carrying his own light, and then incandescent lamps will be chosen; or one single light, or single group of lights, powerful enough to illuminate the whole of the ground occupied may be used. In the latter case the system devised by M. Bazin, and shown in perspective in our engraving, will be found the most suitable.—*Electricite.*



APPLICATION OF THE ELECTRIC LIGHT TO SUBMARINE CONSTRUCTION.

Electric Lighting by New Voltaic Battery System, in London.

It has been a burning question for some time whether electric lighting direct from the primary battery can be carried out on a commercial basis so as to furnish a steady, bright, and reliable light at a comparatively moderate cost. For the purpose of domestic lighting, for the lighting of railway trains, carriages, etc., such a system, if practicable, offers manifest advantages, chiefly because it is possible to dispense with complicated and costly machinery. Among those who have diligently been engaged in solving this problem is Mr. Theophilus Coad.

We remember having inspected a system of lighting from the voltaic battery invented by him some two years ago, and this system has evidently been further improved since then, and is now brought forward by the formation of a company to acquire and work the Coad patent rights. The House and General Electric Lighting Company, of London, formed with a capital of £75,000, intends to undertake the lighting of houses, billiard rooms, shops, offices, railway and private carriages, tramcars, omnibuses, etc., also the supply of motive power for driving small machinery such as sewing machines, lathes, etc. From the installation of the light at the company's offices, the practicability of the system is evident. The two incandescent lamps fed by the batteries give a bright and steady light, such as would form an immense improvement on our present system of lighting by gas. It is not here necessary to give a minute description of the Coad battery, as we are more concerned with the actual results obtained. As to these we must necessarily depend upon the statements made by electrical engineers and others, which, however, appear conclusive. It is claimed that a small portable

battery of six cells, which is on view, will light a small incandescent lamp for thirty hours, without being recharged, and that the cost of recharging is sixpence. From a certificate furnished by electrical engineers of standing, it appears that such a battery was sealed up and found to efficiently light an incandescent lamp for 49 hours. The current is stated by other authorities to be of 4 to 4.4 amperes. Basing their calculations on the working of a battery of 10 cells, the company claim that one incandescent lamp of 10 nominal candle power can be maintained by it for 30 hours, after which it must be charged again to last another 30 hours, while the cost of refilling is stated at tenpence per battery (one penny per cell), which would work out to one-third of a penny per hour to the consumer, for a light of 10 nominal candles, as against the cost of a similar light produced by gas at one-fifth of a penny. The claims made as to cost, we think, are too low, in fact, much too low.

The Electric Light Progress in New Orleans, La.

HISTORY OF THE INVENTIONS OF CHARLES FRANCIS BRUSH.

The system of electric lighting commonly denominated the "Brush" is the invention of Charles Francis Brush, M. E., Ph. D. and electrical engineer, of Cleveland, Ohio. As early as 1862, when only thirteen years of age, he began to experiment with magnets and batteries, his earliest tastes and studies apparently being directed to a plan to utilize the mysterious substance, fluid or current - call it which you may—which Franklin drew from the clouds by the primitive conductor, a silk kite and string.

When fifteen years old, he devised a plan for lighting and extinguishing street gas lamps by the aid of electricity. His school days passed in studies of this character, and his intelligence enabled him to grasp in a short time problems which baffled other minds, or indeed were beyond the reach of ordinary students. Finishing a four years' course at the excellent Cleveland High School in the space of two and one-half years, he entered the famous university of Michigan, at Ann Arbor, from which he graduated 1869 with the degree of mining engineer, being in advance of his class one year, the rule of excelling other students holding good even here.

After this he followed the profession of an analytical chemist, in which he was noted for skill and accuracy. Still following his taste for physics, and withal showing his predilection for tangible science, he engaged in the business and spent the next four years of his life amid the busy hum of machinery, and here learned, seemingly by intuition, the science of mechanics, both practical and theoretical.

In 1875, when the subject of electric lighting began to agitate the Old World and savants were conducting experiments in London and Paris, trying to utilize electricity for commercial lighting, Mr. Brush gave his attention to the subject. No doubt the results of his early electrical experiments, stored in the treasury of his wonderful brain, were then utilized; no doubt some truth which dawned on his boyish mind when he eagerly watched the workings of some rude induction coil gave him then the key note which sounded success. In a conversation with Mr. George W. Stockley, vice-president of the Telegraph Supply Company, of Cleveland, O., a discussion came up whether or not there would be a demand for a dynamo of an entirely different construction from the Gramme and Siemens' machines, which were at that time best known.

To work out these problems Mr. Stockley offered the facilities of his workshop and factory to the master mind and hand of the inventor. Mr. Brush did not accept the offer; he departed without making any promises, and worked in private to solve the problems. Within two months his machine was finished, and the trial took place in the factory of the Telegraph Supply Company. Suffice it to say that this first dynamo was a success, and in 1884 it is still in order. The changes from this first machine have been many, but the difference of principle has not been materially altered. The lamp, however, was not yet invented, and after trying all which had then been offered to the public, none of which suited, Mr. Brush turned his attention to this last one of the lighting problems. It was finished within a few weeks, was an entire success, and was materially the same as now in use.

This was in 1876. That winter the Telegraph Supply Company obtained the exclusive right to manufacture and sell all the Brush patents. In 1880 the company changed its name to the Brush Electric Company, and the new line of business entirely superseded the old. In 1880 the entire works were destroyed by fire, but, having ample capital, the interruption was short, and larger and finer buildings were erected. The business rapidly grew; sub companies were formed, and to day the aggregate capital of the companies operating the Brush system of electric lighting is nearly $30,000,000.

THE NEW ORLEANS COMPANY.

This branch of the Brush Electric Light Company was organized on June 9, 1881, by a meeting of the first board of directors, consisting of W. A. Bell, L. C. Jurey, John Phelps, T. L. Airey, H. Dudley Coleman, Lafayette Folger, Richard Weightman and Charles E Black. The organization was perfected by the election of W. A. Bell, president; H. Dudley Coleman, vice-president, and Richard Weightman, secretary. This was the first meeting as an organization, and was for the purpose of ordering from the works at Cleveland an eighty-light plant, subscriptions for forty lights having already been secured. At this meeting Mr. George O'Connor was engaged as superintendent and electrician, which position he has ever since held, and a building site was also selected. The company commenced on a conservative basis, securing an amount of machinery only slightly in excess of that needed for the orders then promised.

The forty lights first engaged were put in operation on Feb. 1, 1882. Among these first customers of the innovation were the Crescent Hall, Messrs. Cusachs, Lopez, and the most prominent firms on Canal and St. Charles Streets. It was only one circuit, and was a starter to try the experiment of electric lighting in New Orleans. These firms, it may be remarked, have ever since continued to use the system; they saw its advantages and utility; they soon ceased to regard it as an experiment, and their appreciation was shown not only by successive renewals of their first contracts, but also by an increased number of lights ordered. The business became established and was such a success that in the summer of 1882 an additional Corliss engine was added to the plant, making an aggregate horse power of 500, with which to prepare for the business of October, 1882.

In this year the company secured a contract from the wharf lessees for lighting the levee and harbor with 100 lights of 2000 candle-power each, distributed around the crescent and the upper ship wharves for a distance of five miles. This contract required a separate plant of 250 horse-power, operated from the branch station on Notre Dame Street.

In order to introduce the light for street illuminating purposes, the company in 1883 went to the expense of $8,000 for a separate plant for Canal Street, and lit that thoroughfare from the river to Claiborne Street as an experiment, for seven weeks, using thirty-four lamps, the present number, of 2,000 candle-power each. This project, however, fell through, for the lighting committee of the old council was unable, under its contract at that time with the gas company, to cut off the gas lamps, which the brilliant, star-like electric light made unnecessary. In 1884, however, this council committee made a different contract with the gas company, which allowed the turning off of any number of gas lamps at the pleasure of the council, and the plant, which had for twelve months laid idle, was placed in operation, Jan. 1, 1884. The conditions of this contract between the city and the Brush Electric Light Company are, that one-half of the needed money be subscribed by the people of Canal Street, and the city pay the remaining half of the price, $6,000. These lamps at that time extended from the river to Claiborne Street, but the old council subsequently asked the company for a proposition to light the whole Avenue to Metairie Ridge. This resulted in a satisfactory arrangement, and on April 1, 1884, the whole Avenue was lit to Metairie Ridge, making a single circuit of eight miles, the longest continuous stretch of electric lighting at present in operation. Next, Delord Street from Lee Place to the New Basin was lit, and a lamp was also erected at Black Bridge. Under the contract with the Gas Company, the city was enabled to cut off the gas lamps rendered unnecessary, and the expense to the city was but slightly in excess of the price of gas, which extra expense was more than compensated by the brilliant lights secured.

For the lighting of Royal and Chartres Streets, private subscription alone has heretofore been depended upon. This is the third year for Royal Street, and Chartres Street lighting will again commence on Dec. 15, provided the necessary subscription is made in time. If the City Council next Tuesday night ratify the contract made by the lighting committee with the Brush Electric Company, the amount of gas lamps displaced will enable the company to light these streets all night, instead of running only until midnight, as now, under private subscription.

It was found advantageous last summer to concentrate all the machinery and power under one roof, and the central station at the head of Union Street, on Dryades, was enlarged and remodeled at an outlay of $20,000. The plant on Nortre Dame Street was for the time being abandoned, but the machinery being in perfect order, it is kept as a reserve in case a large contract should offer and limited time should call for an expenditure of this surplus power. In the central station the horse power of the engines aggregate 850 and steam is generated in ten immense boilers, which are denominated five batteries of 1,000 horse-power.

There are here fourteen dynamos and by a late invention of Mr. Brush these dynamos, which originally had a capacity of forty lights each, have now, by the insertion of improved armatures, a capacity of sixty-five lights each. The heavy copper wire conductors over the city have a total length of seventy miles, and if the present contemplated addition be made the circuits will aggregate eighty-two miles.

This power gives a capacity for 1,000 electric lights of 2,000 candle-power each, or an aggregate of 2,000,000 candle power. The policy of the company to provide for an increased and increasing demand is here again shown by the surplus capacity of lights, over and above what are now in use, this surplus being 400 lights. The contracts are always made in the summer for next fall's business, but in addition to the exact business contracted for, a surplus is always provided.

New Orleans is probably more generally lighted, in proportion to its population, by means of electricity than any other large city in the world. There are now in operation a total of 655 lights of 2,000 candle power each, of which 450 are paid for by private subscription, and the balance by the city, aided by private subscription. Those placed on thoroughfares, not counting as such the lights in front of business houses or on the banquettes, number 205, distributed as follows:

On the levee, for five miles	100
Canal Street, for three miles	55
Delord Street	3
Royal Street	13
Chartres Street	8
Press Street	5
Morgan Ferry	1
Decatur Street	2
Public Squares,	12
St. Charles Street	2
Carondelet Street	1
Magazine Street	1
Esplanade Street	1
Bourbon Street	1

This is a total of 205 lights, which, both through private subscription and payment by the city, light public streets in addition to these, if the contract for 113 lights be concluded, eliminating some of the above, which are already under contract, the sum total of public lights will be 299, aggregating 598,000 candle power, which makes over thirteen miles of street lighting. Add to this the temporary lighting of Upper St. Charles Avenue by the Exposition authorities, we will have a grand total of fifteen miles of street lighting operated by the Brush Electric Light Company. To this again add the contract for lighting the Government Building at the Exposition with 300 arc lights, of 2,000 candle power each, and the immense business of the company in New Orleans will at once be apparent.

The New Orleans Company, whose proper name is the Southwestern Brush Electric Light and Power Company, has the exclusive right to operate all the Brush patents in the whole of the State of Louisiana. The business in New Orleans has been of such magnitude that it has, up to the present time, occupied most of their attention. It is now the purpose to either establish plants in other sections of the State, or have sub-companies formed operating the light. Many small plants have been sold for outside points—the plants at West End, Spanish Fort, Morgan Shops, Morgan Ferry, the Fair Grounds and the Monroe Oil Mills. In addition to this the principal steamboats entering this port have adopted the Brush apparatus.

This company is now located in every city of importance in the United States. The business is conducted by local companies operating under the patents of the parent office at Cleveland. The city of Detroit is at present the largest city entirely lit on streets by the electric light. This improvement displaced two gas companies and one naphtha company, and the system gives universal satisfaction. In all other cities the Brush light is a recognized feature of improvement, and as an evidence of its worth it has everywhere an established price and does business on a business basis. The system is no longer an experiment. It is an established fact, and the company sells its light like other commercial commodities are sold. The price is always reasonable, and in comparison with other illuminating agents it would be cheap at double the rates asked.—*Er.*

Electric Lighting in England.

TOO MUCH RESTRICTION CLAIMED TO BE DAMAGING ELECTRIC LIGHT ENTERPRISES—THE NECESSITY FOR PROTECTING THE RIGHTS OF CONSUMERS SET FORTH.

The London *Times* of Nov. 22d says: The deputation which waited upon Mr. Chamberlain on Thursday to advocate the abolition of Section 27 of the Electric Lighting Act, was strong not only in numbers and in the attainments of its members, but also in the possession of a very real grievance as the basis of their representations. Electric lighting in this country has made little or no progress, although the success with which it has been carried out at the Health Exhibition, in other places of public resort, and in a few private mansions, has abundantly demonstrated its entire practicability and its great conveniencer There was a time when persons who were building new houses had electric wires inserted in the walls as a matter of course; and it was only when expectation was upon tiptoe that our hope of improved illumination was destroyed by the sudden and complete collapse of all the undertakings for supplying it. In what may be called the speculative period of the history of the undertaking, when new companies were being formed in every direction, and when each one of them was eagerly endeavoring to secure some locality in which to conduct its operations, the public mind was much exercised by fear of the creation of another gigantic monopoly. People had long groaned under the vexatious tyranny of the gas and water companies (which, not content with taking more money than seemed fairly their due, were apt to take it in an extremely uncivil manner), but were accustomed to bear with philosophy the annoyances thus inflicted

upon them, and to derive consolation from the thought that the Legislature had not foreseen all the uses to which the Acts of the companies were being applied, and was not likely again to be caught napping in a similar manner. As soon as electric light companies began to think about applying for powers to conduct their business, there arose a general demand for such restrictions upon these powers as might prevent them from being abused; and the Board of Trade prepared and brought into Parliament a bill by which the new industry was to be regulated. This bill ultimately became law; and it provided that an electric light company, after the lapse of twenty-one years from the commencement of its operations, might be required to transfer its business and plant to the local authorities of its district, who were to pay for the plant alone, and to pay only its then actual value. To the existence of this clause Sir Frederick Bramwell, who was the chief speaker of the deputation, attributed the arrest of all the electric light undertakings, alleging that no capitalists would provide money upon terms which afforded them so small a prospect of profit. He said, in effect, that by the operation of this clause it would be open to investors to spend their money in the development of a great national undertaking, and that when this undertaking had reached approximate perfection, when all the early practical difficulties had been overcome, and when the concern was beginning to pay, the corporation of a town, or other local authority, would have power to step in, to purchase the whole business at the price which its plant alone would fetch, and to carry on the concern. In a word, it was argued that the effect of the obnoxious clause had been to kill electric lighting, and that it could never be conducted upon any extensive scale, as a remunerative business for a public company, until the objectionable provisions were repealed.

The weak point of Sir Frederick Bramwell's argument is that it fails to take note of a necessity which experience has shown to be urgent and imperative—the necessity of protecting the consumer against the exactions which would be rendered possible by the existence of an uncontrolled monopoly. In many departments of trading the purveyor and the consumer meet upon the same plane, neither of them has it in his power to take any unfair advantage of the other, and the various bargains between them may, with propriety, be settled by themselves. Butchers and bakers are numerous, and the prices of their goods are determined by competition. In the case of the purveyors of water, or gas, or light, the case is wholly different, because the capital required for the business is so large as practically to exclude competition. If purveyor A, whether a company or a private individual, is in possession and uncontrolled by law, he may charge whatever he pleases for his commodity, and may constitute himself sole judge of its quality. No one will be likely to oppose him, because if a new plant were laid down by purveyor B, A, by the mere act of reducing his charges, would be able to prevent B from obtaining custom, because nobody would willingly undergo the trouble and cost of making new connections inside his house. A would maintain his monopoly, and B, although his enterprise had reduced the profits of his rival, would lose all the capital he had embarked. These considerations are so obvious that it is only necessary to refer to them because they are so constantly overlooked. The remedy is for the consumers to combine together, and through their official representatives, the State or the local authority, impose certain conditions upon the purveyor, subject to which his business must be carried on. It is possible, of course, that these conditions may be too stringent, and if shown to be so they should be relaxed, but they should on no account be abandoned. Mr. Chamberlain occupied an impregnable position when he told the deputation that he would consider any modification of Section 27 of the Act, but that he would in no wise consent to its repeal. The continuance of the section in some form is a matter of principle, and, after the experience which has been gained from the working of various gas and water Acts, no Government would be forgiven for losing sight of this principle, and for leaving consumers at the mercy of a public company. The want of electric light is, at most, a temporary inconvenience, and it is better to submit to a temporary inconvenience than to be oppressed by a perpetual burden. It will be well for those interested in electric lighting to consider seriously the position of the question and to frame clauses which the Government may be able to accept. The lull which has occurred in the prospects of their business is, perhaps, nearly as much due to reaction after excessive speculation as to any other cause; and, if companies cannot be formed to engage in the new enterprise, it will surely be practicable for the individuals who collectively compose the State to instruct their representatives, the local authorities or others, to borrow the necessary money and to contract with electricians and with engineers for the supply of an illuminant of which, it is certain, the public will not long consent to be deprived.

Communication Between the Shore and Light Ships.

It often happens that a vessel is lost after battling with the sea for several hours in sight of a light ship, and might have been saved if a message could have been sent on shore. But the difficulties in the way of affording such communication have hitherto been regarded as practically insurmountable. They originate mainly in the constant and excessive motion of the light ships, which are moored at the bow by a chain cable 4½in. in circumference, "payed" out sufficiently in rough weather to allow them to ride and swing freely. In this way they often describe a complete circle; and, to prevent the telegraphic cable from being fouled by the moorings, if separate from the latter, especially as it would have to be similarly "payed" out to keep it from parting, has been the main problem. Another danger to be guarded against was that of damage to the telegraphic cable by ships' anchors, light-vessels being generally moored in shallow waters. A year or two ago, however, the whole matter was placed in the hands of the Telegraph Construction and Maintenance Company (limited); and a contract was entered into whereby, as a practical experiment, they were to electrically connect the "Sunk" light-vessel with Walton-on-the-Naze, and maintain such communication for one year, no payment being made in the event of any failure to comply with the conditions, unless such failure should arise during the working of the cable from exceptional causes for which the contractors could not fairly be held responsible. The first part of this contract has now been fulfilled, considerable delay having previously occurred, owing to the necessity for several series of experiments at the company's works and elsewhere. It was foreseen at the outset that, to guard against the dangers already indicated, the telegraphic cable must be enclosed within the ship's moorings; and to determine the best form of the latter, experiments in question were undertaken. Ultimately it was resolved to adopt a hollow steel wire rope, 8½ inches in circumference, formed by fourteen twisted strands; and this rope—capable of bearing a tensile strain of 70 tons, and having the telegraphic cable running through its center—constitutes the present ship's mooring, in lieu of the chain of 4½ inches circumference previously employed. On the 3d inst. the contractors commenced the operation of laying the cable and moorings. Owing, however, to strong south-westerly winds, little could be done for several days beyond fixing the telegraph instruments, consisting of a Morse transmitter, a Wheatstone A. B. C., and a telephone on board the light vessel, and also at Walton-on-the-Naze, and laying the shore end of the cable at the latter place; but on the 7th and 8th inst. the entire work was accomplished with a success which promises well for its future working. This light ship, moored in ten fathoms at low water, is about nine miles from Walton-on-the-Naze. The cable passes under the public road to the post office at that place, which office is in direct communication *via* Colchester with Harwich, from whence the various lifeboat stations along the coast are easily accessible by telegraph.

The Coming "Force."

This is the heading of a short article in *Punch*, complimentary to what appears to be the Fyfe-Main system of electric lighting. Says our bright contemporary: "*Apropos* of the question of economy involved in the employment of the electric light for all purposes of out-door illumination, the chief of the police of New York has gone as far as to say that "every light erected means a policeman removed." Coming from such a quarter this is a valuable contribution to the discussion, and the reflective wayfarer has merely got on a fairly dark evening to attempt his passage on foot along some of the less frequented bye-streets of any of the metropolitan suburbs, to realize very possibly, with the sudden and unexpected assistance of the local burglar's bludgeon, the full force of the statement. Yet this is the nineteenth century, and the most prejudiced holder of gas shares, who passes one of the private electric lights that shed their nightly luster in the Strand, cannot help literally seeing for himself that something little short of a day-lit London is now only a question of time. It would indeed be a gain to the suburban Londoner not only to see his way home in safety, but also to have the additional satisfaction of knowing that the units of the new, unlike those of the old police force, would invariably be found when wanted doing their duty at their respective posts.

The Electrical Exhibition.

Whether it is due to the improvement in the weather, or the reduction of the admission price, the elec rical exhibition in Boston is now drawing large numbers of visitors. There have been few exhibitions held so worthy of patronage, and so instructive as well as amusing, as the one now taking place at the Mechanic building on Huntington avenue, and it is pleasing to see the Boston public so appreciative. The exhibition is now in full bloom, and as the attendance increases it seems to have a thawing effect upon the attendants in charge of exhibits, and they now offer freely the explanations necessary to the proper understanding of the apparatus displayed. It is to be hoped that the management will be able to extend the time of holding the fair, for everyone is anxious to see it, and the delay in getting the exhibits ready has prevented many from visiting the show before. The number of lights has been greatly increased by the additions made by the United States Company, and does great credit to them. The different applications of electricity as a motive power is also well illustrated, not only by the electric railway, but by numerous machines now driven by that force. Visitors are expressing great satisfaction at the things seen, and pronounce the fair, as they well may, a collection of marvels and wonders. The gathering of all these novelties has been a great labor, but will doubtless prove paying to the enterprising managers.

The Westinghouse Machine Company, of Pittsburgh, Pennsylvania, have been partially shut down for a month, in order to set new tools, enlarge their foundry, and build a new erecting shop and store room. They were to start up again on or before December 1st, with a capacity of 100 engines per month They report trade as steadily growing, notwithstanding the depression of the times and the distracting influences of the campaign. The business of the month of October was, in fact, the largest in their experience, their sales amounting to 75 engines. Their output for the month of September was 2,500 H. P., and the month of November promises to be still larger. They have recently made contracts with responsible parties, which insure the sale of the entire product of their works when increased to the capacity above noted, and work will be prosecuted vigorously throughout the winter.

The Electric Railroad at the Zankerode Colliery.

Mr. Robert Thomas Moore, a prominent Scoth mining engineer, recently visited some Saxon collieries, and in the course of an account of his trip, gives the following description of an underground electric railroad at the Zankerode colliery, at Plauen, near Dresden:

At this colliery there is one of Siemens & Halske's electric locomotives drawing coal along a road about 700 yards long. On the surface there is a dynamo, which is driven by belting from a small vertical engine placed with the cylinders inverted, the pulleys being about 3 to 1. The engine is run at about 200 revolutions per minute, and the dynamo about 600 per minute. From the latter the electricity is conveyed down the pit shaft, which is 120 fathoms deep, by means of copper wire ¼ inch in diameter, and in the road it is led along two rails like a T iron fastened to the roof of the mine. The road, which is a cross-cut mine to get over a fault, has a double-line of rails in it, and is arched with brick throughout its length. The conductors are fastened to porcelain insulators fastened in the brickwork. There is a dynamo in the locomotive, which is connected by gearing to the wheel of the latter. Each pole of the dynamo communicates with one of the conductors on the roof by means of a covered wire, one end of which is fastened to a carriage running on the rail, and the other to a pole of the dynamo. When the dynamo at the pit head is made to revolve, the current passes down the shaft to one of the wires and along the conductor until it reaches the carriage; then down the wire to the pole of the dynamo on the locomotive, and passing through the dynamo to get to the other pole, and thence to the return, causes it to revolve, and the motion is conducted by gearing to the wheels of the locomotive. The "race" consisted of 15 tubs, each containing 10 cwts of coal, and weighing 15 cwts. when loaded. The locomotive was put behind the race, and ran the whole length of the drift in four minutes, or at the rate of about seven miles an hour. It was making 25 runs a day, and drawing about 200 tons in that period. The author was told the following was the proportion of useful effect of the arrangement: Steam engine, 10 horse-power; dynamo, 5 horse-power; locomotive, 3 horse-power; thus showing that 30 per cent. of the power of the steam engine was got out of the locomotive. About £900 was the cost of the whole erection at the colliery, and the system has been in operation for nearly two years, the visitors being informed that the engine worked very satisfactorily and gave no trouble. The working expenses were said to be very low. As the cost of repairs was almost *nil*, the chief expenses consisted in the wages of the engine-men on the surface and on the locomotive. It certainly seemed to be a very simple and compact arrangement, and to work very well indeed, and there did not appear to be much that could go out of order in it.

—— No person visiting the New Orleans Exhibition will be disappointed in the size of the buildings. They are colossal, covering sixty acres of ground. It is more than one day's work to walk through the aisles and galleries. Since the Centennial Exposition of 1876 there has been wonderful advancement in the department of electrical appliances. This is to be fully shown here, providing the present designs for electrical railroads and other things are carried out. The grounds are splendidly illuminated by electricity. There are, separate from the buildings, five towers, each 125 feet high, and lighted by ten standard arc lamps. The largest single electric light in the world, one of 100,000 candle-power, is to sprinkle its radiance over the falling jets of the fountain and across the waters of the coming lake. Other powerful lights will add to the brilliancy and light up the grounds and the Mississippi River which flows by. The buildings are all to be illuminated by electricity.

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EDITORIAL ANNOUNCEMENT.

Address all communications and make all checks and P. O. orders payable to order of ELECTRICAL REVIEW P. O. Box 3329, New York.

We invite correspondence from Electricians, Inventors and the Telegraph and Telephone fraternity on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

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Mr. J. Viennot, 150 South Fourth Street, Philadelphia, is our accredited representative for Pennsylvania.

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The American Electric Construction and Supply Company, of Philadelphia, has been placed in the hands of Mr. Alfred F. Moore as trustee. All their property was sold at auction. It is said that Mr. Leavitt, the president, did not give the business any efficient attention and support.

Some preliminary steps have been taken towards bringing about a consolidation of the three electric light companies doing business in Boston. All seem to be more than willing, provided an equitable basis of adjustment can be reached. It looks as though the movement was going to amount to something more than talk this time.

The electrical exhibition in Boston has grown very slowly indeed, and is not even yet all that it is hoped it will be. That there are a number of interesting novel ties is true, but there is no comprehensive exhibit of electrical inventions, and, curiously enough, the thing that invariably draws the biggest crowd is the phonograph, which is not electrical at all.

"The principle upon which your machine is constructed," wrote the expert to whom it had been submitted by the inventor," is theoretically fatal to its working, *but it works.* I am at a loss what to say. "The thing to say is that, *if it works*, the theory which can say it will not work is either false or incomplete. Theories are good things in their way, but when the facts are "ag'n 'em" they have to go under.

The Boston Gas Light Company has been relieved from the responsibility of controlling the Boston City Government, which has weighed heavily upon it for a good many years. It will now have more time to attend to the business for which it was incorporated —the manufacture and sale of gas. How the city is going to get on without its guiding hand, time alone can tell. The fact of this new departure is chiefly interesting, because the electric light will now have what it has never yet had in Boston—a fair chance. It deserves that, and it has never asked more.

Let us hope that it has not escaped the attention of the powers that be in this city and Brooklyn, that all the wires have got to be under ground before another twelve month if the existing law is carried out, and that, should the several companies fail to do the work, it will be the duty of the said powers that be to do it for them, unless they bestir themselves and see to it that the legislature amends the preposterous law passed at the last session of the legislature. Last year the municipalities in question gave themselves no concern whatever about the bill while it was pending, probably did not even read it, or know its contents, and one principal reason why it was so promptly passed was that it was believed that, as municipalities, they wanted is passed. After it *was* passed they read it, and then they learned that, by their silence, they had aided in putting upon the statute book a most troublesome law which nothing short of a court decision could interpret, and no human being could enforce. If "all the wires" are to go under "the streets and alleys," where are the telephones, the telegraph instruments, the fire-alarm bells, etc., etc., to be put in order to be reached by said wires? Are *they* to go under "the streets and alleys" also? The law as it stands is a clumsy piece of legislative blundering, and the sooner it is amended or repealed, the better.

Electric lighting seems to be making very rapid strides in Canada. The long winter there, with its very long nights, makes the matter of illumination, especially in the streets, a very important one, and the advantages of the electric light for the purpose are quickly appreciated by the people. The city of Ottawa, the capital, is to discard gas altogether for street lighting, and is putting in a large plant to be run by water power, of which there is ample, and to spare the year round. The results of this will be specially interesting, because it is only wher eelectricity is used as the *sole* iluminant that its value, effectiveness and economy can be fairly judged. Of course the city is fortunate to possess water power, but it is not certain that its use is necessarily a matter of economy, for experience in our manufacturing cities, cities which owe their existence to the fact that there is water power at or near their site, has shown conclusively that, taken all things into account, steam economically made and properly used is quite as cheap and sometimes cheaper. We do not mean that it was unwise to use the water power in Ottawa, but that other cities which do not possess that seeming advantage need not be deterred from following suit. Nor is it for cities alone that the electric light is in favor in Canada. It is finding its way into many mills and factories, and isolated plants are becoming so frequent that they no longer attract attention. The Dominion is sometimes slow in getting at a thing, but when it does get started, it goes in with a rush. The indications are that Montreal will be a blaze of light during the coming ice carnival.

There is a good deal of stir in Paris over the price charged by the local telephone company to its subscribers. The figure is 600 francs, say $120 per annum. The complaint grows out of the fact that in all the other continental cities, with one or two exceptions, the price is less, and in most of them, very much less. The sum named is the price paid in most of our larger cities, while in New York and Chicago, it is more. If the service in Paris is at all to be compared in quantity and quality with that furnished in the large cities in America, it would seem as though the gay Parisians had no just cause of complaint. If a business house cannot afford to pay $10 a month for the convenience, advantage and comfort which the telephone gives in dispatch of business and the saving of time, it cannot be much of a business house and ought to get along without the instrument. Curiously enough, it is in Paris as it is in America,—those who call most frequently and get the most out of the telephone are the ones who grumble most about the price. The toll system obviates all this, and brings the grumblers to their senses.

An experiment has been attempted in England from which highly beneficial results are expected. This consists in connecting the lightship stationed near the Sunk sand, one of the most dangerous points on the water thoroughfare leading from London, by telephone wire with the main coast, so that any wreck which may take place some distance off land can be instantly reported, thus giving an opportunity to afford speedy relief to the shipwrecked mariners. It is admitted that, if this electrical connection had existed a few years ago, it would have been possible in the interval to have saved at this single point quite a number of lives, and no doubt equally valuable service might be performed if similar direct communications were made with other lightships.

EDITORIAL NOTES FROM BOSTON.

I was asked to-day by a friend, a yachtsman, why it was that there were no electrical launches in our harbor. He said he could imagine nothing more delightful than to have an electrical launch which would go at fair speed, without any boiler, engine, or other such troublesome and annoying *impedimenta.* "I don't see why somebody does not build one," he added. I ventured to suggest that when some such man as himself would order one, there would be no difficulty about supplying it. Electrical launches have been run successfully on the Thames, and there is no reason why they should not be operated with equal success here. I expect to live to see the day when every boat-club will have in its club-house an engine and dynamo for storing batteries, unless somebody should discover or invent a practicable primary battery in the meantime which can do the work. In that event the harbor will be covered with electrical launches, and sails will be at a discount.

It is all very well to talk about the *nominal* power of arc lights. The point of interest is the *real* illuminating power. I look at some of the lights in the streets here and wonder what candle power is claimed for them. Probably "1600 actual." That may do for a claim, but if some of them, measured in the most favorable way possible, give 600 candle power, my eyes deceive me very seriously. The fact is that this city and every other city using electric lights needs a qualified inspector in its own pay and employ to keep his eye on the lights, and see that the lighting companies keep them up to the mark. It would be better for the cities, and better for the lighting companies.

I looked into the new exchange room of the New England Telephone Company the other day. The new multiple board is all in place, and the work of connecting in the wires is progressing as rapidly as such intricate and delicate work can be done. The board is equipped for two thousand connections, and has a capacity for forty-seven hundred. There have been so many postponements owing to unlooked for delays that Col. Parker is a little careful about setting the time when the new exchange will be in operation, but it cannot be very long deferred now.

I am told that somebody has got a battery in this city, which, from one cell, gives an electromotive force of twelve volts and is proof against polarization. I haven't seen it, nor have I seen any one who has seen it, but I have got so near as to see men who say *they* have seen men who claim to have seen it; just as I, some years ago, saw a very old man in Plymouth who, in his younger days, knew a man who had seen Peregrine White, who was born on board the May Flower. Now I will not say that I deny the story about the battery, but I will say that I shall fully believe when I see it and test it. Why people who have such a battery should keep it dark is a puzzling question. They say, however, that a company has been organized on the basis of this piece of apparatus, and that a good deal of stock has been "placed." The stock part of it does not interest me, but I *would* like to know about the battery.

I chanced to meet Mr. Wadsworth, the Boulton Carbon Company's representative in this city, a few days ago. Thinking it a good opportunity to ascertain something of the condition of electric lighting affairs, I questioned him as to their business this winter. Mr. Wadsworth tells me that his company is selling over one million carbon points per month, and are from three to five hundred thousand carbons behind their orders. They are practically running two factories—their old one and part of their new one; but they will probably have all their machinery in operation in their new factory in January. From what I could learn, their new factory is the largest carbon works in the world, and will have a capacity of two million carbon points per month. This is exclusive of battery goods and novelties, in which they are doing a very large business. Speaking of the growth of the carbon business, Mr. Wadsworth said: "Three years ago we began business in a small way in an old building in Cleveland, our capacity the first six months being about one thousand per day. Our manufactures, however, soon attracted attention, and orders poured in thick and fast, necessitating constant additions to our factory. After our purchase of the United States' Electric Lighting Company's factory at Newark, last summer, we decided to begin at once the erection of a new factory, for which purpose we purchased a large tract of land on the corner of Wilson Avenue and the Lake Shore Railroad. Upon this we have erected three large brick buildings. Since the original plans for this were handed us by our architect, we have twice altered them, each time increasing our capacity, and trust we have at last arrived at a point in this respect where we will be able to meet promptly the enormous demands upon us." In reply to the question as to the increase of the output of electric lights by the different companies, he said: "We watched that part of it very closely, and our trade, particularly during the summer months, is a very accurate barometer of the condition of that business; and when I tell you that our regular business during tae mid summer months, last summer, increased over twenty-five per cent., purely from the increase in the sales of electric lights by the different companies, you can judge something of what is being done by them. I know of one company that has within the past two weeks sold over eight hundred arc lights." In reply to a question as to the recent decline in the prices of carbons, his answer was: "We began the reduction the 1st of last January, since which time we have reduced the price of our goods fully fifty per cent." "But have not some of the companies still quoted prices lower than yours?" "Yes, but we have not found it necessary to meet these lower prices, as we are able to sell more than we can make at the prices I have indicated, and our patrons take our goods at that price, presumably because

they prefer them." I asked about an attempt that was made some time last fall to form a combination of the different manufacturers, and Mr. Wadsworth said: "There was a meeting of all the different makers at the Gilsey House, in New York, but I do not feel at liberty to go into the detail of it. Our people thought it unwise to take our company into such a combination, and withdrew from the meeting." In reply to a question as to the monthly consumption of carbons in this country, Mr. Wadsworth said it was very large, but declined to estimate the number.

In his inaugural address on Monday, Mayor O'Brien, referring to the illumination of the streets of the city, said: "There are now under the charge of the Lamp Department 9,781 gas, 36 large gas burning 30 to 100 feet per hour, 2,591 oil and 401 electric lights. The gas companies have made contracts with the city at comparatively low prices, and a considerable addition has been made to the number of gas lamps during the year. The electric light is also very desirable for our crowded thoroughfares, squares, and public places, and the city is far better lighted now than it ever was before. The cost for the financial year 1875–76 was $496,456 53, with an aggregate of 10,242 lamps and no electric lights. The cost for the year 1883–84 was $496,915.91, with an aggregate of 12,242 lamps and 381 electric lights. The cost the present financial year will not exceed the cost of last year, notwithstanding the large addition of gas lamps. A well-lighted city, I am satisfied, is a great protection to our citizens and their property, a preventive of crime, and a great assistance to the police and fire departments in the performance of their duty." Doubtless the fact that Mayor O'Brien is himself connected with electric lighting prevented him from adding that it was the introduction of the electric light which induced the gas company to make contracts at "comparatively low figures," and that to electricity alone is due the fact that the city had much more and much better light in 1883–84 than in 1875–76, without any increase in expense. And he might have added, although it did not come within his province to do so, that every citizen of Boston has been benefited by the reduction in the price of gas, which the electric light has brought about.

The Boston Fire Commissioners, in their official statement to the new Mayor, say: "Twenty-four keyless doors have been applied to boxes in addition to those previously in use, thus saving much valuable time in giving alarms. There are 339 boxes in service and nine more to be located, with about 260 miles of wire. Fifty-four bells in towers are connected with the fire-alarm telegraph, all but five being owned by the city. Forty-two public clocks are cared for by the Fire Department, 24 of which are owned by the city. During the year a new illuminated clock (by electric light) has been built for the city and placed in the tower of the Lyceum Hall building in East Boston."

The Western Union folks have got some of their underground wires working, and, it is probable that, before these lines are printed, the much-offending line of masts—call them not poles—on Friend Street will be taken down. Up to the present time those of the underground wires that have been connected up work satisfactorily, and it is hoped that the others will do likewise and continue to give good service. But telegraph men tell me that underground wires are not safe to bet on, and that they propose to wait a year or two before giving any very decided opinion. One thing is certain: This is a *bona fide* and a very expensive attempt on the part of the telegraph company to go underground, and if it should not prove successful it will be no fault of theirs.

Telegraph rates are way down—ten cents for ten words from Boston to New York and all intermediate points. As this, in many cases, includes calling on the sender for the message, and its delivery to the person addressed in all cases, it will be seen that there cannot be any very great margin of profit.

When things are cut down as fine as this, it seems right to speak of another matter which has sometimes engaged the attention of telegraph men more or less. I believe that the only safe rule is to charge for what you give and no less, and to pay for what you get and no more. To-day I had occasion to send a message to a person whose address could not be accurately stated in less than twelve words. My message contained just nine words. My signature made three more. That made twenty-four in all that the operator had to send, all for ten cents. Another man's correspondence might be addressed in six words, his message be the same as mine, and his "sig." two, say seventeen words in all, for ten cents. Now why should not a charge be made for address and signature? They form integral and important parts of all messages, and although the present plan may "average" right, it is not equitable to the public, for it is manifestly unjust that another man should pay for the transmission of seventeen words the same price that I pay for twenty-four. Over all ocean cables, and I think in Europe generally, address and signature count as words just as much as the body of the message, and inasmuch as they represent service rendered, I cannot see why they should not.

The case is exactly paralleled in the matter of baggage, although, on many roads, more sensible ideas prevail than formerly. I remember a trip I made to Saratoga "a many years ago." My plunder was contained within the compass of a "grip." On the next seat was a lady who evidently believed that "apparel makes the (wo) man," for she had four big trunks, whose safety gave her much uneasiness throughout the trip. Yet she paid no more than I. It is easy to say that I too might have had four trunks. But I didn't need them, and therefore didn't exact the service at the hands of the company. As a matter of fact I was paying for her baggage. "They manage these things better in France," to quote Laurence Sterne, for there you pay for your passage, and for your luggage too if you have any. I may add that I saw the lady later at a hop at the hotel in Saratoga, and wondered what she needed of four trunks full of clothing. She certainly wore very little.—But this is not electrical.

A friend of mind told me a true story to-day,—"part of which he was, and all of which he saw"—which admirably illustrates the fact that it is very dangerous for uninstructed persons to meddle with things which they do not understand. The friend in question—suppose we call him W.—— an electrician of modest pretensions but of marked ability, and thoroughly practical withal, was called upon to go to a cotton mill and put a stop to the bad habit which the fibers of cotton had of standing out from the yarn "like quills upon the fretful porapine," owing to the static electricity present. He went, saw, and conquered, by grounding all the shaft and pulleys, and the spinning frames as well, and by setting "rakes" in front of the belts and grounding them. The electricity went to earth, and the fibres lay down peacefully. Not long after he was called upon by the superintendent of another mill, who wanted him to come to his establishment at once. "But I can't go," said W. "But you must," said the superintendent. "My spinning room is shut down." "What for" said W. "Because," said the superintendent, "I tried to get rid of the electricity just as you did at that other mill, but it is worse than ever" "What did you do," quoth W. "Do? Why, I bought a lot of china wash-basins,—non conductors, you know—put one under each spinning frame, filled with it water, and then grounded all the iron work in the water by means of wires. Whenthe water got fully charged I meant to throw it out and fill up with fresh, but it didn't work. Isn't that your way?" We went out to the mill, grounded the metal work, not to water, but to the *water pipe*, and all worked smoothly. I asked W. if he explained the matter to the amateur electrician. "No," he said, wearily, "it wasn't worth while."

The National Insulator Company, of which Mr. Lytle is the active spirit, is getting on famously. The insulator, as readers of the REVIEW know, is made with a patented collapsing tool in one motion, and every insulator is exactly like every other, the screw being absolutely perfect, and affording a sure bearing throughout its whole length. The percentage of waste in manufacture is reduced to a mere nothing, and the speed at which the cany be turned out is very much greater than by either of the old methods. The company also owns the American patents for the Lewis screw top insulator, described in the REVIEW not long ago, and are manufacturing very easily by making a slight modification in the tool used. I learn that the Rhode Island Telephone Company has quite a number of the new insulators, pony size, in use, and likes them very much indeed.

The screw gas lighter which the Domestic Electric Company is making would seem to leave nothing to be desired. The chloride of silver battery has been discarded, and in its place is a small magneto, operated by depressing a pin with a knob at the end and a spring to restore it to place. Of course there is an interior spring and other devices not seen. Its action is sure every time, and there is no such thing as renewal needed. Next week I shall send you some notes from Providence, Worcester and other New England cities.

DYNAMO-ELECTRICITY; ITS GENERATION, Application, Transmission, Storage, and Measurement. By George B. Prescott: with 545 illustrations. New York: D. Appleton & Company, 1884.

It is a relief to turn from the electrical literary rehash, principally foreign, with which we have been so frequently served AD NAUSEAM, to something original, and again a pleasure to find our desire for an American description of American electrical appliances gratified.

Mr. Prescott is an electrician, as well as an author of acknowledged ability and enviable reputation, and the series of volumes in which he treats upon the various important branches of electrical science and art, hold a high place in electrical literature.

We feel in this connection that American practice has attained a prominence quite worthy of a more extended record than it has heretofore received, and we heartily commend the author for his labors in that direction.

The work commences with a review of the electrical field, particularly that of electric lighting up to the year 1878, and then by easy stages, and in a delightful manner, the subject of electricity from the dynamo in all its ramifications is brought up to date. To describe in detail the method of its accomplishment would be quite as impossible as to express the full measure of our gratification and instruction. The author possesses that happy faculty of so arranging dry, hard facts, as to add to them the spice of interest and make their perusal a pleasure rather than a task; his views are remarkably sound and expressed with a characteristic simplicity and clearness, and in treating upon subjects of dispute, individual jealousy is disarmed, not at the expense of truth, but with notable tact.

In that portion of the book devoted to the electric light, is given nearly complete, the very interesting report of a committee of the Franklin Institute, containing the determinations made by Edwin J. Houston and Elihu Thomson, of the various dimensions of a number of the dynamos now in use, such as their sizes, weights, the power absorbed, light produced, relative efficiencies, etc., etc., and explaining the methods by which these were obtained, and discussing the comparative merits of the machines.

We must also note the complete manner in which the Edison system is exhibited. It is given in the minutest detail, a greater portion of the matter being entirely new. Especially excellent is the description of the theory and process of manufacture of the new Maxim carbon filament, now used by the United States Electric Lighting Company.

A resume, by Mr. M. G. Farmer, of his original experiments upon the subject of lighting by incandescence, is inserted by the author, and whilst it is naturally interesting, coming from so distinguished an electrician, it is likewise important as a matter of history.

We quote: "When we shall see the electric light distributed in our dwellings, it may prove a source of pride to Salem to call to mind that this boon met with its first success in that city, when a parlor in Pearl Street was lighted every evening during the month of July, 1859, by the electric light, and was undoubtedly the first private dwelling-house ever lighted by electricity."

This was Mr. Farmer's residence at that time.

Electric lighting, with all its accompaniments, is described and discussed in a very clear and complete manner. In the latter part of the volume we find described an exceptionally large number of dynamos and motors, including all the later patterns, Edison's, Fields', Siemens', and several other systems of electric locomotion, and also a variety of general applications of DYNAMO-ELECTRICITY. It concludes with a chapter on electrical measurements.

We venture to predict for this work a ready popularity both with the general reader, for the varied information it contains, as well as with the electrical engineer as a valuable book of reference.

In Favor of the Convention.

To the Editors of the Electrical Review:

I was much gratified at reading Mr. Bowen's letter and subsequently your editorial on the subject of a convention of the electric light people for organization, for mutual protection, and advantage. I have often wondered why such action had not been thought of before. I think it will be conducive of great good to all parties interested, and would suggest Chicago as the place, and at an early a day as possible. Chicago is neutral ground, easy of access, and consequently good rates can be obtained from the hotels. This is also about the half-way house between the East and West. To my mind, the mere exchange of opinions at such a meeting would be of incalculable advantage. The Southern, Western, Middle, and Eastern States men could all meet there. From a geographical standpoint, I think Chicago decidedly the best city in the Union for such a meeting. By all means let's have the meeting, and as soon as possible.

Cleveland, Dec. 27, 1884. AMPERE.

At St Paul, Minn., on Sunday last a serious fire occurred in the operating room of the central office of the Erie Telephone Company, causing damage to the extent of nearly $50,000, which, we understand, was fully covered by insurance.

The *Bulletin* of the Compagnie Internationale des Telephones states that, thanks to the experience acquired in mounting the first generator, the second is, according to the Creil engineers, put down under much better conditions of working, as regards the suppression of passive resistance. In addition to the transmission of power, M. Marcel Deprez intends, in conjunction with Dr. Hertz, to conduct, at Creil, experiments in long-distance telephony.

On his return to Minneapolis from his eastern trip on Christmas morning, Mr. W. F. Black, general superintendent of the Northwestern division of the Erie Telegraph and Telephone Company, was presented with an open-faced gold watch, with his monogram on the back, and within the following inscription: "Presented to W. F. Black by the employes of the N. W. Div., E. T. and T. Co., Dec. 25, 1884." This was a graceful act towards one who is deservedly popular, not only among his associates in the employ of the Erie Company, but among all with whom he comes in contact throughout the extensive territory under his charge.

Telephonic News

*** The Southern, New England Telephone Company is sending out circulars inviting business men to investigate and patronize its "long distance" telephonic communication with New York.

*** The Compania Telefonica, La Uruguaya, now under the control of Messrs. J. K. Theobald & Co., of Buenos Ayres and Montevideo, which has in use over 700 Bell telephones in Montevideo, has given an order for 300 more to the United Telephone Company, River Plate. The United Company supplied at once 100 from a shipment arriving on 5th instant by the Malabar, and cabled for the remainder. La Uruguaya company expects to have 1,000 subscribers in Montevideo.

*** The official returns of the Erie Telegraph and Telephone Company for October have just been received, and are as follows:

Gross earnings	$47,701.16
Expenses	28,988.17
Net earnings	18,712.99
Construction	6,341.21
Net earnings above all expenses	$12,371.78

*** It appears from a latter by Signor Ferrini to the *Lumiere Electrique* that the 90 per cent. of work recorded at Turin, was obtained by measuring the intensity of the primary and secondary currents with two Siemens electro-dynamometers, previously compared with one another, and the differences of potential at the respective terminals with two Mascart electrometers. It is, therefore, not the useful effect, that is to say, the ratio of energy expended to energy recovered, but simply a co-efficient of transformation proper to the apparatus.

*** By the end of June last the Vienna telephone lines attained a length of 175 kilo meters (108 miles). The total length of wire in the cables was 1,300 kilometers (807 miles), and in underground lines, of silicon bronze wire 1mm. in diameter, 1,683 kilometers (1,045 miles). The number of subscribers was 708, and that of direct connections, 120. In the month of June nearly 52,500 messages were sent by the subscribers, making 1,750 a day. The two central offices, which open at 7 o'clock in the summer, and 8 o'clock in winter, closing at 9 o'clock, are served by 42 girls.

*** Until the Minister of Agriculture at Ottawa, Canada, has gone through the evidence taken in the suit to set aside the Bell telephone patent in Canada he refuses to give his decision. The question raised is an important one, and should it be decided against the Bell Company there are hundreds of valuable inventions patented in Canada which will probably suffer the same fate. The Bell Company admit that unintentionally they have not acted up to the full letter of the law, but they think that a liberal interpretation should be placed upon it in view of the large interests at stake. It will probably be two weeks before the result of the investigation is known.

*** A correspondent asks for facts regarding the financial situation of the Mexican Telephone Company; also, the reason why the rise in Bell and other telephone stocks did not affect the stock of the Mexican. Facts are meager regarding the Mexican company. It appears to have suffered somewhat from the general depression in Mexico, but still shows some growth in the number of instruments in use. It more than pays expenses, and also, it is believed, construction, leaving a small surplus. The victory of the Bell Telephone Company over the Drawbaugh company was a benefit to all companies using the Bell instruments, but less to the Mexican than most others, as it could obtain instruments of any other make if necessary.

*** Flirting over the telephone wires must stop. One of the great causes of complaint against the telephone service has been that it was difficult to get the attention of the girls who are stationed at the central offices, and whose duty it is to connect the wires of different subscribers when asked to do so. The innate desire of the female mind to flirt with manly-voiced young fellows could not be repressed, despite many efforts to do so. Now, however, flirting will be abandoned, for there has just been placed in the offices a little instrument called the "Monitor Desk," and invented by Mr. E. A. Eckert, chief operator of the Metropolitan Telephone Company, New York. By means of this the man in charge of each office can just hear everything that is said over every wire running into the office without the girls being aware of the fact. Now if any girl listens to or says sweet nothings to some "mash" at the other end of the wire, the superintendent can tell her to keep her "taffy" at home, or something equally cruel.

This "monitor" was first tried some months ago in the New St. office and it worked so well that it has also been placed in the Nassau St. and Spring St. offices, and the others will likewise be supplied shortly. It is expected that through its detective activity business will be transacted in one-half the time now required.

Kansas City and Northwestern News.

KANSAS CITY, MO., Jan'y 2d, 1885.

The recent change in the staff of the Union Pacific Railway officials takes some very competent men from here to Omaha, Neb. Mr. J. J. Burns, who had been chief operator of the Kansas Division, has been transferred to Omaha, and given the title of General Storekeeper and also has entire charge of the telegraphic system of the road. He is a young man, but possesses the qualifications for the position. The western telegraphic fraternity will heartily applaud his promotion as one deserved and proper. The position of General Superintendent of the Kansas Division of the Union Pacific, made vacant by the deserved promotion of S. T. Smith to the General Superintendency of the Union Pacific system, fell to the lot of former Division Superintendent J. O. Brinkerhoff. Mr. Brinkerhoff is a fine gentleman and a thorough railroad man, but he has one fault that of refusing to move a railroad safety gate with all its paraphernalia, representing a value of upwards of a thousand dollars, out of the way of a telephone wire, even when courteously requested to do so by the telephone manager here. This latter gentleman, with tears glistening in his eyes that shed a radiance over his hard-drawn copper cheek, stated that Mr. B. seemed so tickled over the consistency of the request that he set up the cigars, but refused to budge the safety gate an inch, and consequently the wire had to be moved fully six inches! He thinks the telephone fraternity should be warned against this man Brinkerhoff!

Mr. Chas. Smith, former manager of the Indianapolis Exchange, goes into the office of General Manager Annett, of the Rocky Mountain Telephone Co., January 1st, as his assistant. He is one of the most capable of young telephone men, having been the first Edison operator in Indianapolis, and then advancing to the responsibilities of manager. He stopped in Kansas city on his way west, remaining here a few days as the guest of his father, Gen. Supt. Smith, of the Mo., Kans. and United Telephone Cos.

Frank Knight, of the Palmer Wire Co., was here a few weeks ago and received a warm welcome from the telegraph and telephone fraternity. There is a demand for first-class wire out here that never fails to bring Knight nosing around.

Chas. Brown, of the Western Electric Co., spent several days in the city recently, the guest of Aug Crandall, of the Mo. & Kans. Telephone Co.

Mr. E. L. Patch, an old time telegrapher, now Superintendent of the Wells-Fargo Express Co., with headquarters here, is suffering very poor health, and his many friends are uneasy concerning him.

Considerable interest in the Drawbaugh suit was noticeable throughout the West, and Judge Wallace's strongly written opinion in favor of Bell was very generally endorsed. The decision materially strengthened stock of western telephone companies, and it now looks as if a boom was to follow the depression of the past eight months.

Speaking of the sea shore, doesn't Mr. T. D. Lockwood, the eminent electrician, say that long lines near the sea shore work better and are "quieter" than those of the interior? (Perhaps they keep quiet to hear what "the wild waves are saying.") A letter to a telephone gentleman in this city, written from the Massachusett's coasts by a man thoroughly familiar with what he is writing about, contains the following which is respectfully referred to Mr. Lockwood:

"I find that trunk lines or extra-territorial lines don't work near as well here as they do in the West; we have two lines to Boston by separate routes; one of them a No. 4 wire, distance only 40 miles, and it doesn't work near as well as your Topeka wire. The Topeka wire mentioned is fully 70 miles in length, running east and west.

Genl. Supt. Smith, of this city, has inaugurated a system of recording and checking toll line and extra-territorial business that is proving quite a success in expediting the business and doing away with all disputes over bills when rendered. The system may be in vogue at some other points but as I have never seen it in print I give it brief mention here: A ticket with proper blanks filled out is used for each incoming or outgoing message, and but one form is used in getting from the subscriber the information desired "Who is this to be charged to?" is the first question by the toll line operator, thus notifying the subscriber that the connection is to be paid for, and that the company wants to know who is to pay it. Next question: "Who is talking, please?" and the answer noted down and is often important in settling bills, and in getting right party to telephone where a connection has been delayed. The next question is: "Who shall I ask for there?" and then the distant station called like this: "Thos. Johnson, Kansas City, wants Geo. Brown, at Topeka." In no case is the subscriber to remain connected and listen to the giving of the order, or the conversation between the operators in getting the connection, but he is disconnected until the party he wants is at the telephone and then he is promptly connected and the conversation had.

Negotations are pending for the construction of an extra-territorial line between Topeka and Emporia, 60 miles. Emporia now has toll line to Americus, 11 miles; to Madison, 8 miles; to Cottonwood Falls, and Strong City, 20 miles, and a line to Topeka will no doubt be kept busy, as it passes through Osage City, where a line extends to Ottawa, and through Burlingame and Carbondale, all thriving little cities. This is all in the territory of the United Co., which now has a number of paying toll lines. This same company has just completed a line, 21 miles long, between Columbus and Galena, Kansas, via Baxter Springs, using the newly invented paper insulators. The insulators are proving very satisfactory, and the line is very quiet and clear, notwithstanding the fact that the Fort Scott Railroad Co. has a line of poles carrying several busy wires running parallel with it the entire distance. This is the first experiment with the paper insulator in telephone circles out here and indications are that it will prove a success.

January 28th, 1885, the annual meeting of the stockholders of the Missouri, Kansas and United Telephone Cos., will be held in this city, at the office of the Secretary. Directors and other officers for the coming year will be elected. At the meeting one year ago the stockholders found their stocks decreasing in value, this time they will have the satisfaction of seeing them going in the other direction. There is inquiring now for telephone stock, and but few sales reported as the holders seem desirous of waiting a little longer for best figures.

Probably Mr. Bell is not aware of the relation he holds to a popular singer, as evidenced by the following paragraph from the *Times* of this city:

"It is not generally known that Laura Bellini, the Italian prima donna with the Abbott party, is descended from an illustrious family. She is closely related to Vincenzo Bellini, the celebrated Italian composer, 'La Somnambula' having been written for her aunt, who created the rôle of Amina. Her great uncle was John Bellini, the grand old whig, who headed the constitutional union ticket of Bellini and Everett in 1860. She is also related to the Bellini of telephone fame, and while in this city received special attention from Mr. E. L. Fabrini (Smith, after Count Fabrini, the noted tenor, whose real name is Horace Smith) of the telephone company, a cousin on the maternal side. Laura Bellini has the soft, languishing beauty of the Orient, with what our esteemed contemporary would call 'flurries of the Italian and flashes of the French.' We have it too on the very best authority that 'her voice is increasing in sweetness and volume' She is universally admired by the populace, Americans and Italians as well."

The chief of Kansas City Fire Department has the following to say of the telephone, which is used exclusively here for giving alarms of fire: "The Manager; of the K. C. Exchange and those connected with him, are deserving of the thanks of the property owners, and especially of the fire department, for their earnest endeavors in giving the alarms, particularly in the business part of the city. By their promptness many thousands of dollars have been saved from destruction by fire. The telephone system has worked admirably during the last year; we have had no trouble in locating fires. This is due to the good management of the exchange."

BI-POLAR.

Some of the Inside Workings of the Operating Room.

There is probably no class or sect of men to whom are intrusted more secrets than telegraph operators, and yet the only means taken to prevent their divulging news of the gravest character is the threat of dismissal. If the police authorities or private detective agencies in any part of the State want to make an important arrest they use the wires freely without, as a rule, the least fear of their intentions being betrayed. All classes of business men do the same, knowing that the secrecy of their dispatches will be kept inviolate.

In addition to all this the telegraph operator gets all the news of the day in advance of any one else. Births, deaths, marriages, conflagrations and shipwrecks all pour in upon him after something of the fashion of a whirlwind.

All day and night long this specimen of humanity sits listening to recitals horrible enough to dethrone an ordinary man's reason, and yet his digestive organs are not in the least impaired nor his appetite interfered with. He forms a part of a class of men whose only governing principle is "Come day, go day, God send Sunday:" and like many other professions or callings, that of the telegrapher furnishes its quota to the ubiquitous tramp, there being numbers of them who go from city to city on foot, without a penny in their pockets.

To a reporter, one of the most efficient operators in the Western Union Company, related some interesting facts about the operating room there. An experienced operator can tell, he said, in an instant when there is, what is known in telegraph parlance, a plug at the other end of the wire. An open warfare is at once begun, and although swearing over the wires is prohibited under pain of dismissal or a heavy fine, there is much more of that commodity indulged in than the managers are aware of.

"Get away from there you lubberly plug," so to speak, yells the New York man to the incompetent genius, Chicago or Cincinnati. "If I were near you I'd break every bone in your body. Get away from there, I tell you, and let some one who knows how to send come to the key. I cannot read you, I tell you, plug, plug. plug go home and cut wood; you are too clumsy."

Should the Chicago man persist, the operator at New York opens the key, thus cutting off the communication, and, if the truth must be told, causing a delay in many instances to important dispatches. Periodically he closes the key to see if the so-called plug has disappeared and hails the signal of "Hello, Jim, what's the matter?" from the regular operator, and business operations are at once resumed. On the busy wires, as soon as the relief operators take the places of those who have been on duty during the day or night, it is customary for one to ask the other, "How many have you?" meaning messages to be sent. The number is given and each man insists that it is his turn to go ahead first. After some badgering a compromise is reached by an agreement to toss a penny in the air and cry "head or tail." Should the New York man toss the coin and the operator at the other end call the right side, he is not seldom cheated by being told that he has lost. To this he replies by calling his colleague a host of anything but biblical names. However, time is saved by the operation. There are few stops, if any, and in a short space of time as many as sixty-five and seventy messages have been transmitted to the far West, after which New York receives a similar number.

The mistakes or blunders that are made in messages of all kinds are ludicrous, as well as dangerous, and in many instances make the dispatch wholly unintelligible. Such mistakes are punishable by fines, as well as a set-back to the promotion of the blunderer, who is readily discovered when the messages are compared in the Clearing House. To prevent such errors in all important messages relative to transactions in stocks of large undertakings they are repeated back from the office of their destination."

"How are so many errors made?" was asked of the operator.

"Some of them are very simple." was the reply, and can only be understood by members of the craft, while others are inexplicable. A great many blunders are caused by defections on the wires, while many are made by bad adjustment and the loss of some of the letters or signals at the beginning or ending of a word. There are also a number of mistakes attributable to bad sending, or, in other words, running all the letters or a portion of them into a jumble of signs or signals."

"Does not the context of a message help the receiving operator out, even if the sender should make a blunder?"

"Not always. Frequently we have no time to study the context, and in case the message is long, the operator whose ear and pen are busy at one and the same time soon loses the continuity of the sentence or paragraph and has to let it go. The vast majority of blunders are made, as a general rule, by incompetent men who prefer to run up the number of messages receive sooner than consider their correctness. There are two difficulties staring the incompetent operator in the face. There is always one of the managers rushing to and fro and if he sees a man stopping too often to get words repeated he removes him to a less busy wire or circuit, which retards his promotion or an increase in his salary. On the other hand the operator who is sending to him may send a message by a roundabout way, telling the manager that the man on such a wire is delaying the business and requesting that a more competent man be put to the instrument."

"What kind of operators do young women make?"

"Some of them turn out very well. Others never arrive at what is considered perfection. As a general rule, girls are not adapted for working long circuits. Their touch is too fine, and they cannot send the current through like men. On short circuits they do very well. Say, for instance, you want to send a message from an uptown office to Washington, Buffalo or some distant city. It has to be sent to the main office first and then send to the men's operating room, where it is finally transmitted to its destination. This method does not cause nearly as much delay as one would at first suppose. The system is so complete that the time lost is so infinitesimally small as to be unworthy of notice."

"The salaries are not as high as they used to be, as you say; and now-a-days an operator must be away up to earn $100 a month. Besides learners are constantly coming from every direction, who, of course, receive small salaries at first, and in time claim the position of first or second class operators."

Prof. Dolbear's Detached Receiver.

To the Editors of Electrical Review:

Will you kindly permit me to correct some editorial statements concerning my detached telephonic receiver, contained in the issue of the 27th inst. First, it is *not* "connected by two insulated wires about a yard long each," there is only *one* such wire. Second, the "chief office of the brass ball" is *not* "to keep the wires hanging down in a straight line." It has a very particular electrical function. Third, you say "where this is held in the vicinity of a telephone wire over which talk is in progress it is heard by induction, just as talk is heard by induction when two wires are side by side in the air." If by that is only meant that talking is heard in both cases, it is true and doesn't mean much, but if it is intended to imply that the electrical conditions are the same in the two cases then again it is incorrect, for with my apparatus the effect is best at the *end* of the line and *not* parallel with, as is the case with talk heard with the magneto telephone. As for its not being new, I *do* think it to be new, and an effect which would not be predicted, and I have never shown it to a competent electrician (and I have shown it to a very great number, at home and abroad) who did not express surprise at it. There is a profounder difference between electro-static action and electro-magnetic action than has heretofore been generally thought. Prof. Rowland emphasized it in his address before the electricians at Philadelphia, and Sir Wm. Thomson said to an acquaintance that the only two novel things exhibited at Philadelphia were Delany's telegraph and Dolbear's static telephone.

In the same paper you publish the letter of Mr. Farmer on some of the history of the development of electricity as a motor. Permit me to add that in 1854 and 1855 Mr. Henry M. Paine, of Worcester, Mass., made some extensive experiments (for those days) in this direction. He had several motors constructed, one of which was intended to be of ten horse power, this and other smaller ones were exhibited in public in running order, and I myself inspected them pretty thoroughly, and as nearly as I can now remember they looked exceedingly like Dr. Merritens machines' of to-day. Paine found that the batteries then in use could not be depended upon for motor work, and set himself to improve and make constant the batteries. In this I presume he did not succeed, as I have not heard of his machines since. Maxwell is said to have expressed surprise that a Gramme machine could be used as a generator, or as a motor. I have never been able to understand why he was surprised. So long ago as 1855 I tried to make one magneto electric machine drive another similar one, using the common small hand magnetos, then made for medical purposes, but not succeeding, I wrote to the *Scientific American* to inquire why it didn't work. The only testimony I have now of this is the brief reply of the editor in the "To Correspondents" column, marked A. E. D., Me., where I was then living.

A. E. DOLBEAR.

COLLEGE HILL, MASS., Dec. 27th, 1884.

[We gladly give place to the above, because we would by no means do Prof. Dolbear an injustice. Our conversation with him was brief, and a good deal interrupted, but we certainly got the impression, which seems to have been erroneous, which we gave. EDS. REVIEW.]

... Arrangements are being completed at the naval observatory to extend the system of dropping time balls at Boston, Baltimore and Hampton Roads, and ultimately to New Orleans. This will be done automatically by telegraphic connection with the observatory clocks, as is now the case with the time ball in New York.

.... The Baltimore and Ohio Telegraph Company begins the New year by sweeping reductions in its rates. The rate of 50 cents for 10 words between this city and Chicago is cut to 15 cents, applying both ways. Between Philadelphia, Baltimore, and Washington to Chicago the new rate knocks tolls from 50 cents to 20 cents, which will be the charge also between Chicago and Pittsburg, Cleveland, and Indianapolis. The former rates of from 60 to 70 cents between Chicago and cities in Massachusetts, Rhode Island, and Connecticut, become 25 cents for 10-word messages. Telegrams may be sent between this city and Boston and other New-England cities for 10 cents, former rates having been from 25 to 30 cents. The 10-cent rate will prevail East from Philadelphia, Baltimore, and Washington, and the 20-cent rate West as far as St. Louis. In regard to night messages, the uniform charge over the entire line becomes 15 cents for 15 words.

The company is very proud of its record for the year past, in which, overcoming grave and stubborn legal obstacles, it has added to its possessions 28,000 miles of wire, raising the mileage of the company nearly to the point reached by the Western Union system at the close of the war. The wires are of the best material and have been put up to stay. In a short time the company will announce, it is expected, the completion of extensions into Texas, Louisiana, and the entire South. With this announcement the management will attain an end long sought, and make the world pay tribute to its enterprise, for its connections with the Mackay-Bennett cable are already in operation.

.... Concerning the new cable, the Philadelphia *Times* says that the public will be justified in hoping that at last there is to be some actual competition in ocean telegraphy, the two cables of the new Commercial Cable Company having been successfully laid and open for business. They are operated by the Muirhead duplex system, which allows the transmission of messages both ways at the same time, thus making the two cables equal to four operated under the old system.

The real interest to the public, however, lies not so much in the increased business facilities afforded by the new cables as in the reduction of rates which signalizes the beginning of the new enterprise. A reduction of twenty per cent. in rates is made at the outset, regular messages being taken at forty cents a word, press messages at twenty cents, and deferred messages, or those which can be transmitted when the cables are not in use for other business, ten cents. The old rates were fifty cents a word for regular messages, and press and deferred messages in the same proportion. The reduction by the new company has been promptly met by the old lines, so that the cost to the business public will be decreased one million dollars annually, if no more business should be transacted than usual. In all probability, however, the reduction in rates will be met by a corresponding increase in business, which will give the various companies nearly as great an income as before.

The projectors of the new enterprise deserve great credit for the energy and determination exhibited in carrying it forward to a successful termination. The cable service has become a prime necessity to the business public at the present day, and it was high time that it should be wrested from the grasp of a close corporation that levied upon its patrons whatever exactions it pleased. Former attempts at competition seem to have been made by companies too weak to maintain a long conflict, and they were drawn one after another into the pool, which existed only for the purpose of squeezing out of the public the last possible cent. The new corporation is composed of parties backed by unlimited means, and there is every reason to believe that cable rates have not only come down to stay, but that they will be still further reduced as fast as the increase in business will warrant further reduction. The reign of the old cable monopoly is at an end, and nobody will mourn the departure of its scepter.

TELEGRAPHIC

.... The Bankers and Merchants' Telegraph Company is to run four additional wires from New York, passing through Hartford, in connection with the Mackay-Bennett cable system.

.... The reduction of twenty-five per cent. made by the Mexican Telegraph Company in its rates to and from Mexico and the United States, via Galveston, Tex., which went into effect Jan. 1st, gives very general satisfaction to the commercial public of this country.

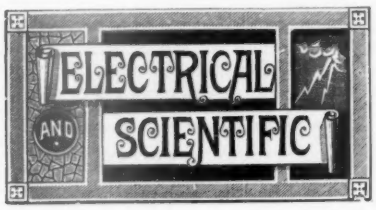
.... The certificate of incorporation of the Utica District Messenger Company was filed in the County Clerk's office at Utica last week. The company is formed for the purpose of owning and maintaining or owning interest in lines of electric telegraph and grants therefor, within the limits of New York State, and for using and operating such lines for a general telegraph business.

.... Sept. 20 there were, according to the Western Union books, 163,807 shares of stock in the names of brokers, and 636,193 shares in the names of others. The number of shareholders was 3,816 Dec. 20, the brokers' shareholding was reduced to 132,963, and other shareholding increased to 667,087. The number of shareholders was 4,330, an average net gain of 47 per week.

.... Mr. Storke, the Director of Swedish Railroad Telegraphs, has invented an electric apparatus for preventing collisions. The little instrument is attached to the edge of the rails at certain places, and connected to the station by means of a telegraph wire, which is united at the station with a dial, over the face of which a needle moves. When a train passes the spot where the instrument is set, an electric current is opened, and the needle shows the spot where the train happens to be at that moment.

.... The telegraphic lines in Andalusia are unworkable in consequence of the earthquake. Advices received by mail show that the results in Malaga were even more terrible than heretofore reported. The loss in the town exceeds $500,000; 227 houses were damaged. During the excitement caused by the earthquake a religious procession headed by the bishop implored Divine mercy. Renewed shocks were felt in various places yesterday. Further damage was done at Cordova, and the inhabitants are leaving the town in a panic.

.... According to the *Telegraphist* the proposed competition between British telegraphists, the second of its kind, has been abandoned. This determination would appear to have been come to in consequence of a letter written by Mr. Patey, one of the secretaries of the General Post Office. It may be remembered that, through the kindness of the engineering department, a Wheatstone receiver was lent for the use of the competitors at the first contest last February, and the concession was highly appreciated by the telegraph clerks of the country. When the application was renewed a few days ago, the following letter was received from Mr. Patey:—"General Post Office, London, December 12. Sir,—With reference to your letter of the 8th inst., addressed to the engineer-in-chief, asking for the loan of certain telegraph instruments for use in connection with a proposed competition of British telegraphists in February next, I beg leave to acquaint you that this department is not prepared to lend any instruments for such a purpose.—I am, Sir, your obedient servant, C. H. B. Patey. Mr. W. Lynd." An appeal has been made to the Postmaster-General with a view to having this resolution reconsidered, and, failing a reply satisfactory to the telegraphists, an agitation is proposed to be set on foot against the action of the department in the matter.



* * Beaten aluminum leaf may now be obtained in books like silver leaf, and is largely used instead of silver for decorative purposes. Mr. Levison suggests heavy aluminum leaf as a substitute for tin foil for coating Leyden jars, and similar electrical apparatus. Area for area, it does not cost much more, is much lighter, and permanently retains its polish. A book of fifty leaves of aluminum, of the ordinary thickness, costs twenty-five cents; of a thickness suitable for Leyden jars, fifty leaves, about four inches square, costs $1.

* * Steel can be written upon or engraved by first cleaning it with oil, and then spreading a coating of melted beeswax over it. The writing can then be done on the beeswax with any sharp instrument, and the lines and marks thus made should be painted with a fine brush dipped in a liquid made of one ounce of nitric acid and one-sixth of an ounce of muriatic acid. When the written lines are filled with this liquid, it should be allowed to remain five minutes, and then the article should be dipped in water and afterward cleaned.

* * A curious incident is narrated in the *Leipziger Illustrirte Schuhmacher Zeitung*, relative to an invention. A certain Herr Haake, of Norden, a master shoemaker, announced a short time since that he would give a sum of 300 marks (£15) to anyone who should bring him a perfect boot without a single seam. The third day following the announcement a shoemaker named Hellmann, of Kleinheide, waited upon Herr Haake with a boot more than fulfilling the requirements, inasmuch as it was made of one piece of leather, had not a single seam, and, moreover, was even closed at the top, which bore the inscription, "Hellmann, Kleinheide, 1884." In every other respect the boot was perfect, and the aperture at the top could be made without difficulty. The inventor left his boot with Herr Haake, and agreed to explain the process of manufacture if the latter could not find it out unaided.

* * Within a few days experiments have been made at Cincinnati with the new electric railway brake with good results. The tests were made on the Cincinnati, Washington and Baltimore division of the Baltimore and Ohio Railroad, and were under the immediate supervision of General Manager I. H. Stewart, and Master of Transportation I. E. Rose. The brake has been in use for several months, and the special trial spoken of was made with a heavy coal train of ten cars, each car weighing, empty, about eleven tons, and having a tonnage capacity of 40,000 pounds. The brakes were applied only to the freight cars and caboose, there being none on the locomotive or superintendent's car, and no hand brakes were used. The loaded train, with full steam on, was put to a speed of forty-eight miles per hour on a down grade of sixty-eight feet to the mile, and brought to a dead stop in thirty-seven and a half seconds after putting on the brake, the distance run in that time being 445 yards, exact measurement. The brake acts automatically in case the train should part, and signals both cab and caboose, and applies the brake to the rear portion, still leaving the engineer with complete control of the forward portion.

* * Riding up town in a Broadway car was a young foreign-looking gentleman of sallow complexion who attracted attention. Every once in a while a light would gleam from out of his scarf and illuminate the expanse of white collar above it. The light came from a small electric glow lamp made into a scarf pin. The lamp was in a small bulb of glass, about three-eighths of an inch in diameter, and the light itself was no larger than a pin's head. It glowed, however, with exceeding brightness from time to time, and the owner felt elated at the notice he attracted.

"Never seen one before?" he said to a reporter, who was aboard the car. "I got this in Paris a little over two weeks ago. They are quite common there, and I guess they will soon be so here."

"Where does the power come from to light the lamp?"

"Here it is." Saying so, the young man took from out of his pistol pocket a small inclosed box containing a battery. This box was about the size and shape of a flat four ounce bottle, such as druggists use for medicines. Two wires led from the box, and connected with the scarf pin. About five inches distant from the box the wires passed through something like a button, which, being pressed, completed the circuit. Whenever the owner of the apparatus wished his pin to glow, he simply pressed the button.

* * A writer on the development of electricity in machine belting driven at a high velocity says that Herr Bacher, Inspector of Lighting at the Dresden Theatre, has detailed some interesting experiments which he recently conducted. The pulleys become veritable frictional machines. Herr Bacher declares that very powerful effects may be produced. A Leyden jar has been charged in a few seconds, giving sparks four millimeters long when discharged. A person standing on a stool having glass legs can draw powerful sparks from a belt charged with electricity by approaching to it the tip of one of his fingers at a distance of ten or fifteen millimeters. All the other well-known experiments of frictional electricity may be repeated with perfect success. Unfortunately, the development of electricity in belts and pulleys is dangerous, and it is probable that to this cause many disastrous fires might be attributed which are generally classified as spontaneous. Flour mills and factories, in which the air is heavily charged with floating organic particles, are peculiarly subject to these mysterious conflagrations. All lines of shafting should, therefore, be metallically connected through their bearings with other masses of metal or with the earth, so that the electricity may be carried insensibly off as rapidly as it is generated.

* * The railway mileage of the United States increased only about 4,000 miles during 1884, making the total, in round numbers, 125,600 miles. The climax of railway construction was reached in 1882, during which year the mileage increased 11,596 miles. The year 1878, the last year of shrinkage of values preceding the business revival which culminated in 1880, gave an increase of only 2,666 miles, but it was not business depression alone that checked railway construction in 1884. The increase of mileage has been greater than the increase of population and commerce, so that time must be allowed for the nation to grow up to the railway facilities already provided. Important lines are yet to be constructed, and undoubtedly the mileage will creep steadily upward for a long time to come, but no expansion like that of the last fifteen years can be expected. In 1869, when the last spike of the Union and Central Pacific was driven at Ogden, Utah, the railway mileage of the United States was less than 44,000 miles. The magnitude of the expansion can be understood by remembering that the present mileage of the United Kingdom of Great Britain and Ireland is less than 19,000 miles, or only about three times that of the State of New York. This comparison will be sufficient to indicate to any intelligent person that it would be folly to expect railway construction in the United States to continue at anything like its rate for the last fifteen years, and the most marvelous developments may be witnessed in other parts of the world. England is considering the project of constructing 20,000 miles of railway in India, and the plans for the expenditure of $150,000,000 have already been drawn. China is not an inviting field for railway contractors, but Japan is and Africa may soon be.

* * The centenary of the London *Times*, celebrated on New Year's Day, has directed general attention to the development of that famous journal under the administration of three generations of John Walters. The first John Walter conducted the newspaper for eighteen years, and when he surrendered it to his son, in 1803, it had only 1,000 circulation. The administration of the second John Walter continued until 1847, and the *Times* had then attained only a small part of the wealth and influence which its present proprietor has secured for it. Eight years ago an offer of $4,250,000 was made for the London *Telegraph*, which was rated as fourth in value among the newspapers of that city, and the circumstance provoked estimates of the wealth of rival journals. The *Times* was rated at $25,000,000, the *Standard* at $10,000,000, and the *Daily News* at $6,000,000. The *Times* earned its title of "the Thunderer" under Mr. Delaine, the great editor who sacrificed his life to its service, and whatever its influence now as compared with that of the Delaine regime, its advertising patronage was never more valuable. Its circulation has never averaged 100,000, but it receives more from advertisers than contemporaries whose circulation is vastly greater.

* * The Hon. Benjamin Butterworth, commissioner of patents, labored earnestly during the last session of Congress to obtain from that body the relief which the Patent Office so sorely needs, in the way of increased appropriations for the employment of additional examining and clerical force, and urging the necessity for enlarged departments for the transaction of the steadily growing business of the office. Mr. Butterworth is now himself a member-elect of the next Congress. This body, however, does not meet, except it be called together in extra session, until December, 1885, and unless the present Congress takes some favorable action before its dissolution in March next, the Patent Office will continue to go on in its present crippled condition for a year, and perhaps a year and a half to come. Mr. Butterworth succeeded last spring in getting a slight increase on the former appropriation, but his present position is such as to give added force to any effort he may now make in behalf of the inventors of the country to obtain from the Government what has only thus far been withheld by the grossest injustice.

In the meantime we trust that inventors themselves will not be entirely idle. There are enough of them in each Congressional district who have been greatly annoyed or injured by former delays in the Patent Office to exercise a potent influence on the action of their representatives. Let all such inventors, as well as those who are expecting in future to have business relations with the Patent Office, write direct to their representatives, urging prompt action on this hitherto greatly neglected matter. The present session is a short one, lasting only till March, but the appropriations now made must govern the business of the office for the year commencing next July. It is evident, therefore, that there is no time to lose, and interested parties should strongly urge that this appropriation should be one of the first considered, and not to be left to the hurry and accidents of the closing days of the session.—*Scientific American.*

Electricity vs. Steam.

Mr. Charles J. Van Depoele has taken another step forward in discarding the engine which has furnished the motive power for the Van Depoele Electric Manufactory on Van Buren Street, Chicago, and put in one of his newly-completed motors. An interesting exhibition of the electrical transmission of power was given on Wednesday, Dec. 24. The dynamo is furnished with a strong current from the generator by means of two copper wires. At 10 o'clock the belt was thrown off the steam-engine and the electric current turned on, and the machinery of the manufactory worked on without a break The new dynamo is a diminutive affair when compared with an engine, and seems incapable of performing the work assigned to it. It is only eighteen inches wide, thirty-four inches high, and three feet long, including the shafting and two magnates; its total weight is only 700 pounds. It carries 160 pounds of copper wire, which is from 300 to 400 pounds less than is carried by any other dynamo ever invented. The armature makes 1,000 revolutions a minute and develops a twenty-horse power. These dynamos can be made from one-horse power up, and can be used to run sewing machines as well as the most extensive factories with their machinery and elevators. "I am looking for the day when steam engines will be generally discarded," said Mr. Van Depoele, "and all motive power will be furnished from electric central stations. We can furnish the power and lights for a city. The use of electricity is economy. We can produce a one-horse power at the rate of one and a half cents per hour. With the present system of steam engines, manufacturers pay three to four cents per horse power every hour. We can furnish steady electric power, clean, noiseless, and requiring no attention, for two and a half cents per horse power an hour, and make a handsome profit."

Wooden Magnets to Cure Disease.

A curious example of the force of imagination is reported from Philadelphia. Dr. George C. Harlan, surgeon to the Wills Ophthalmic Hospital in that city, in the current number of the *Medical News* reports a curious case, showing the great influence of the mind upon the body, and the beneficial effects of a wooden magnet upon both. A young Philadelphia woman, Lizzie D. by name, applied at the Polyclinic, Thirteenth and Locust Streets, for relief from a disease of the tonsils. She was treated by Dr. Solis Cohen. Her disorder was attended with hysteria, and, like all hysterical people, the idea of being doctored filled her with delight. Shortly after her initiation the nervous symptoms became more and more marked, and she was transferred to the care of Dr. Mills, the well-known neurologist. Five or six weeks previously she had had pleuro-pneumonia, and after that paralysis attacked the arms. This was cured, but the disease manifested itself in the legs and feet. Besides this there was a numb feeling in the lower part of the body, and twitching on the right side of the face similar to that seen in St. Vitus' dance.

Dr. Cohen applied a Charcot magnet in front of the ear. To his amazement the spasms on the side of the face touched by the magnet were greatly lessened in frequency and extent. It was evident that the cure was the result of imagination. After that she was attacked with eye troubles. At first there was no defect other than headache after the prolonged use of the eyes, and some shortsightedness; but at length the right eye became, apparently, entirely blind, and muscular spasms of the most violent character disturbed not only the eye, but the face and neck. She was sent to the eye hospital, and treated by Dr. Hansell. After several examinations, the Charcot magnet that had proved so efficacious in the hands of Dr. Cohen was applied to the defective vision, and with the most astonishing result. After many applications, it occurred to Dr. Harlan that it would be a good idea to try unmagnetized iron of the same form and appearance of the magnet. A wooden "magnet" was procured, with iron tips, to give the metallic impression to the skin. It was placed in the drawer where the original Charcot instrument had been kept, and the patient was thoroughly ignorant of its character. Before it was applied it was noted that the pupil of the right eye was widely dilated, as in disease, and was perfectly rigid when exposed to a bright light. There was twitching of the muscles of the right side of the face.

The application of the wooden magnet had a wonderful effect. Shortly after the painted wood was applied with much seriousness to her head, the twitching of the muscles stopped, and the face assumed its normal appearance. Gradually the pupil of the right eye became of the same size as the other, and freely responsive to light. The wooden magnet had triumphed.

Dr. Cohen a short time ago had a case where the wooden magnet proved its efficacy. A patient of his fell down, and thought she dislocated her elbow joint. She was treated for that by a practitioner called

in the emergency, and he discharged her with a stiff arm, which he said he was unable to straighten. Dr. Cohen examined the arm, and found no dislocation at all. He asked her to report at the surgical department of the Polyclinic for verification of his opinion. She called, and Dr. Steinbach noted extreme spasm of the biceps, the tendons being like whipcords. Dr. Cohen applied a wooden magnet, and the spasms relaxed at once.—*Exchange.*

New Design of the Buckeye Engine.

IMPROVED FOR GENERAL AND SPECIAL SERVICE.

In the new design of the Buckeye automatic cut-off engine (recently brought out by the Buckeye Engine Company, of Salem, Ohio), for special work in driving generators where high speed is required, we find incorporated many mechanical advantages of adjustment, in all its parts, for natural wear, compensation in position of valves, any variation in speed or the regulation at different speeds, and to cover all the ground of requirements of close economy in the use of steam, and close regulation, which, aside from durability, comprise all the vital points of any steam engine.

The new "Tangye" frame Buckeye is firsts hown on the "crank" or "front" side. The "Tangye" frame is now acknowledged to be one of the best forms for stationary engines of the high and medium high-speed class in this country and in Europe, and the minor changes made is this bed are of adaptation to the engine, and in no way changes of principle. The application gives great strength, rigidity, and condenses the amoun of power, so far as superficial measurement goes, into much smaller compass, which is, in many instances, a most material point of consideration. And another important point is accessibility.

Fig. 2 shows the "valve side" or back side of Tangye Buckeye valve gear, connections and regulator (main pulley or flywheel not shown). From this side we get an idea of the simplicity of the whole affair, and a good idea of the strength of the frame and its adaptation to the purposes for which it was designed.

The engravings give an excellent view of the general form of this bed. It is made with quarter adjusting boxes or the angular pillow block, according to the wishes of the purchaser.

One of the largest engines we have noticed during our travels driving an electric light plant was at Albany, N. Y., where we found a 400 horse-power Buckeye in use. A plant of 3,000 incandescent lamps at Elmira, N. Y., is also driven by a Buckeye. At the Electrical Exhibition, Philadelphia, the Brush exhibit was driven by a 175 horse-power, the United States (Weston) exhibit by a 120 horse-power; and in the expert testing of all the dynamos this engine was selected. At the American Electrical Exhibition, in Boston, the Buckeye people have a 60 horse-power engine, specially designed for electric lighting, now in use driving the Weston and Consolidated dynamos. We learn that the business of the Buckeye Company for 1884 exceeded that of 1883 by 116 engines, averaging 100 horse-power. Two hundred and eighty men were employed on full time. Geo. A. Barnard, M. E., 69 Astor House, New York, is the general eastern agent of this company.

* * The Pemberton Mills at Lawrence are driving an elevator in their store-house by means of a six-horse power Sprague electric motor—one of the identical machines shown and operated in the late electrical exhibition at Philadelphia. The electricity for propelling the motor is furnished through two wires from their Edison dynamos situated in the mill about one thousand feet away from the motor. As they only use the elevator in day-light, having nor using any artificial lights in the store-house, the dynamos, which supply 450 lamps in the mill when needed have always by day sufficient surplus to supply the motor at the store house.

The elevator is of sufficient size to carry six bales of cotton. There is often a good deal of work in a mill yard for which it would be very convenient to have a small portable steam engine. It may perhaps be possible to mount a small electro-motor on wheels so as to make it easily portable; to anchor it where needed, and to operate it with a wire from the dynamo machine.

For many purposes, especially for night repair work requiring special power, such apparatus might be very desirable, since power and a safe incandescent light might be furnished from the same wire at the same time.

The six-horse power dynamo in use in the Pemberton store-house weighs between 1100 and 1200 lbs.

A two-horse power motor could be easily carried by two men, and anchored wherever needed. It may be suggested that special machine shop tools could be operated on repair work at night in a much safer way than to run full lines of shafting from the wheel or engine. Perhaps calico-printing machines may be operated in this way, and even special departments of mills in which extra work is required to meet emergencies, if the shafting is so adjusted that the lines especially needed can be cut off from the rest.

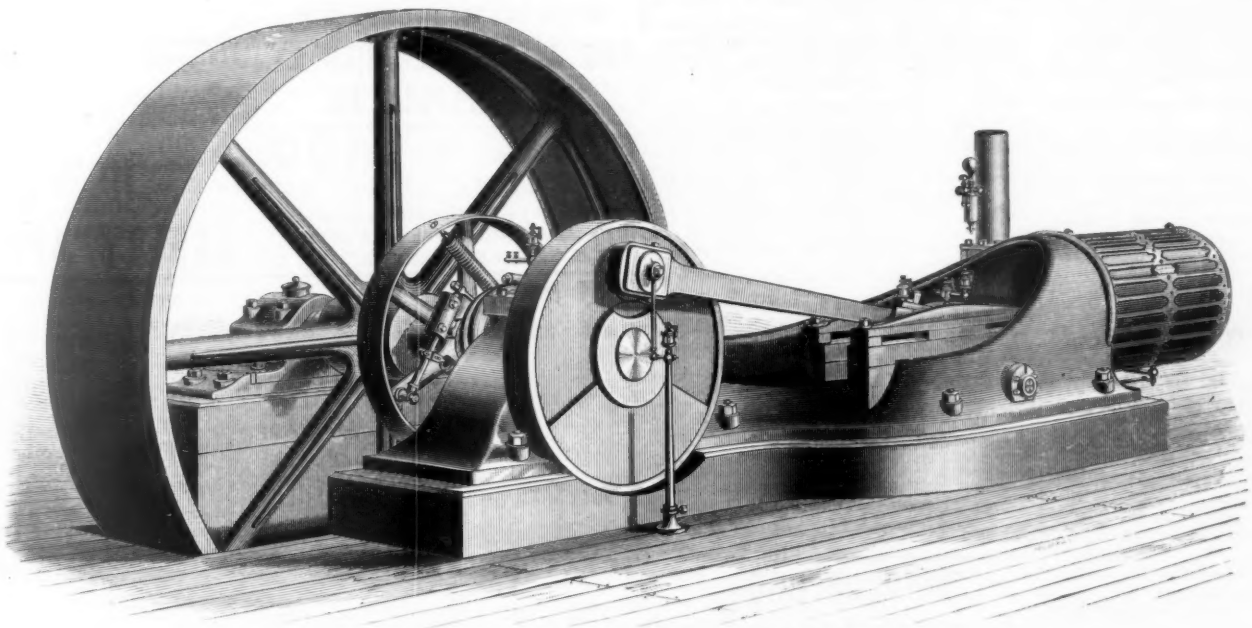


FIG. 1.—NEW TANGYE BUCKEYE ENGINE. CRANK SIDE.

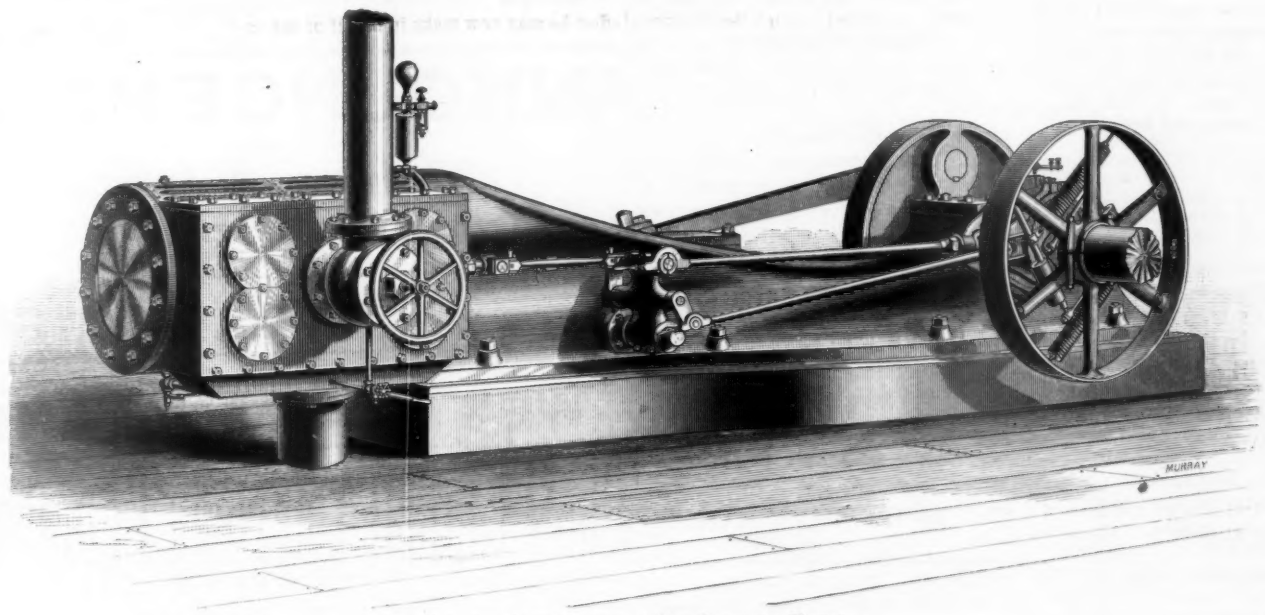


FIG. 2.—BACK VIEW OF NEW BUCKEYE ENGINE.

ELECTRIC LIGHT NEWS

—— The Low Art Tile Works, at Chelsea, Mass., are now lighted with Brush-Swan incandescent lights, run from a local dynamo.

—— The citizens of Racine, Wisconsin, are congratulating themselves upon their electric lights, which the Thomson-Houston Electric Company have just placed there.

—— The Brush Electric Company, of Cleveland, Ohio, have just completed an installation in M. Costello's, No. 929 Broadway, of fifty Swan lamps supplied by a Brush self-regulating dynamo, and run by a Skinner & Wood engine.

—— The United States Electric Light Co. of Charleston, S. C., are using two 300 H. P. Buckeye Engines. 70c. per light per night is not considered a high rate in this latitude.

—— Less than one year ago the Municipal Electric Light Company was organized, and started business with only 115 lights. The demand is such that the capital stock has been increased to $250,000, and a new station, of iron and brick, fire-proof, 60x100, is being erected to accommodate the increased business. The capacity of the new building will be for 600 lights. The system of the Thomson-Houston is used by this company. President Cooper says that one electric light, costing $250, will give more light than twelve gas lamps that cost $350 per year.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING DECEMBER 30, 1884.

309,816 Electric arc lamp; Joseph B. Allen, Springfield. Ill.

309,838 Polarization battery or electric accumulator; Camille A. Faure, Paris. France.

309,886 Secondary battery; William A. Shaw, Pittsburgh, Pa., assignor to the Electrical Accumulator Company, New York, N. Y.

309,897 Device for applying electricity to the human body; Eli H. Thurston, Hagerstown, Ind.

309,907 Method of, and means for, joining sections of conduits for electric conductors; Benezett Williams, Chicago, Ill.

309,937 Electrical measuring apparatus; Moses G. Farmer, Newport, R. I.

309,939 Galvanic polarization battery; Camille A. Faure, Paris, France.

309,971 Electrical gas lighter; Alexander R. Molison, Swansea, County of Glasmorgan, England.

310,002 Electric gas lighter; Charles W. Weiss, Brooklyn, N. Y.

310,004 Galvanic battery; Edward Weston, Newark, N. J.

310,059 Insulator; Hamilton L. James, Junction City, Kansas.

310,068 Telephone; Wm. R. Miller, Baltimore, Md.

310,094 Telephonic apparatus; Theodore F. Taylor, Brooklyn, N. Y.

310,099 Electro-magnetic dental plugger; James H. Van Ness and Mortimer A. Bland, Charlotte, N. C.

310,106 Time indicating apparatus for electric circuits; John C. Wilson, Boston, Mass.

310,119 Regulator for electric lamps; Charles L. Buckingham, New York, N. Y.

310,124 Electric arc lamp; Alexis Davidoff, St. Petersburg, Russia, assignor to Theodore Basileosky, same place.

310,140 Thermo-electrical pad; Schuyler C Kram, Cincinnati, Ohio.

310,145 Incandescent electric lamp; Otto A. Moses, New York, N. Y.

310,151 Telephone transmitter; J. Harris Rogers, Washington, D. C.

A printed copy of the specification and drawing of any patent to the annexed list, also of any patent issued since 1865, will be furnished by any of the patent solicitors whose advertisements appear in this journal. In ordering please state the number and date of the patent desired.

If an invention has not been patented in the United States for more than one year, it may still be patented in Canada. Cost for Canadian patent, $40.00. Various other Foreign patents may also be obtained.

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ELECTRICAL EXHIBITION, Phila. Sept. 8, '84.

R. J. PRATT,

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Yours respectfully, J. W. WEIR,
Chief Engineer Edison Co.'s Exhibit.

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As Contracting Engineers, we design, estimate for, purchase and supply First-Class Machinery only, for all purposes within the legitimate range of our practice, having always in view our relation to the Client as his Consulting Engineers. We reserve the right to reject any contract based upon engineering which in our judgment is unsound.

As contractors and business men, we deem it policy to secure control of such Specialties of extraordinary merit as may be, from time to time, approved by us, and to develop the general market therefor, outside of our personal and professional practice. We emphasize the statement, that no specialty will appear on our list which will not carry with it the seal of our best judgment, based, not upon opinion, but upon actual test, rigidly conducted in our own interest.

We recognize the fact, that no article, however meritorious, is applicable in all situations. Hence, when the interests of the customers are best served by some appliance outside of our immediate control, we invariably recommend it, and supply it if desired.

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Care R. EASSON, 54 Pine Street, New York.

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